

REMARKS

The Applicants thank the Examiner for the allowance of claims 41 – 51, 59 – 66, 79 – 96, 100, 102 and 112.

Claim Objections

Claims 1 and 104 are objected to because of the following informalities:
In claim 1, the long-hand name for “EDDHA” is not written; and in claim 104, “triethylenetetranitrilo-hexaacetic” is misspelled. Claims 1 and 104 have been amended to correct these informalities.

Claim Rejections – 35 U.S.C. § 103

The Examiner has rejected claims 1-13 and 104 under 35 USC 103(a) as being unpatentable over Liu et al. (U.S. Patent No. 4,817,652) in view of Morinaga et al. (U.S. Patent No. 5,885,362). The Applicant respectfully traverses. The cited references, either individually or in combination, do not teach or render obvious all of the elements of the rejected claims. In particular, the cited references do not teach the element of independent claim 1 of “exposing said wafer to a solution comprising: NH_4OH ; H_2O_2 ; H_2O ; and a chelating agent comprising ethylenediaminediortho-hydroxyphenylacetic acid (EDDHA), wherein said wafer is exposed to said solution for a time in the approximate range of 30 seconds and 90 seconds while spinning said wafer and applying acoustic waves to said wafer.” In contrast, Liu merely teaches centrifugal spray cleaning of wafers and fails to teach exposing a wafer being cleaned to the cleaning solution for a time in the approximate range of 30 seconds and 90 seconds while applying acoustic waves to the wafer. Morinaga merely teaches methods of preventing the deposition of metal impurities on a substrate from a surface treatment composition and fails to teach exposing a wafer to be cleaned to the cleaning solution for a time in the approximate range of 30 seconds and 90 seconds while applying acoustic waves to the wafer. Additionally, it would not be obvious in light of the cited references to expose a wafer to the cleaning solution for the time period in the range of 30 seconds and 90 seconds because neither of the cited references describe cleaning a wafer in a single wafer cleaning tool while applying megasonics to the wafer in order to minimize the cleaning time of a single wafer. Therefore, the Applicant respectfully submits that independent claim 1 and claims 2 – 13 that depend upon and incorporate the limitations of claim 1 are not rendered obvious by Liu in view of Morinaga.

Claims 106 and 108-110 are rejected under 35 USC 103(a) as being unpatentable over Lin et al. (U.S. Patent No. 6,063,695) as in view of Hayashida et al. (U.S. Patent No. 5,840,127). The Applicant respectfully traverses the rejection of independent claim 106 over Lin in view of Hayashida. The cited references, either individually or in combination, fail to render claim 106 obvious because the cited references do not teach the claimed element of

“cleaning said wafer with a solution comprising: NH_4OH ; and desferriferrioxamin B. Specifically, neither of the cited references teach desferriferrioxamine B. In contrast, Hayashida teaches adding desferrioxamine E to an SC1 solution (NH_4OH , H_2O_2 , and H_2O). Desferrioxamine E is not the same as desferriferrioxamine B as claimed by the Applicant in claim 106. Desferrioxamine E is a cyclic compound and desferriferrioxamine B is a linear compound. Lin also fails to teach desferriferrioxamine B. The Applicant has cancelled claims 108 – 110. Therefore, the Applicant respectfully submits that claims 106 and 108 – 110 are not obvious over Lin in view of Hayashida.

Claims 15-23 are rejected under 35 USC 103(a) as being unpatentable over Liu et al. (‘652) in view of Morinaga (‘362) as applied to claim 1 above, and further in view of Olesen et al. (U.S. Patent No. 5,996,595). The Applicant respectfully traverses. Claims 15 – 23 depend upon and incorporate the limitations of independent claim 1 and thus are not obvious over Liu in view of Morinaga and further in view of Olesen because, as explained above, claim 1 is not obvious in light of Liu in view of Morinaga.

Claim Rejections – 35 U.S.C. § 102

Claims 52, 53 and 56-58 are rejected under 35 USC 102(b) as being anticipated by Ban et al. (U.S. Patent No. 5,470,461). The Applicant respectfully traverses. Independent claim 52 has been amended such that claim 52 is no longer anticipated by Ban. In particular, claim 52 now claims a method of rinsing a wafer and the elements of “dissolving a gaseous oxidant comprising O₂ or O₃ into said H₂O at a point of use of the rinse; and applying the rinse to a wafer within a single wafer cleaning tool to oxidize Cu⁺ on the wafer.” In contrast, Ban merely teaches a process of producing pure water and fails to teach a method of rinsing a wafer including the elements of dissolving a gaseous oxidant in water at a point of use to form a rinse and applying the rinse to a wafer in a single wafer cleaning tool to oxidize Cu⁺ on the wafer. Therefore, the Applicant respectfully submits that independent claim 52 and claims 53 and 56 – 58 that depend upon and incorporate the elements of claim 52 are not anticipated by Ban.

Claim Rejections – 35 U.S.C. § 103


Claims 67-78 are rejected under 35 USC 103(a) as being unpatentable over Lin et al. (6,063,695). The Applicant respectfully traverses. The Examiner states that it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to use any range of times in dispensing HF solution on the wafer as disclosed by the Lin reference, including using the range of times as claimed by the Applicant for the purpose of quenching the etching process. The Applicant claims “dispensing an HF solution on said wafer for between 2 – 3 seconds to etch approximately 0.5Å – 5Å of a thermal oxide on said wafer.” The Applicant respectfully submits that it would not be obvious in light of Lin to dispense an HF solution on a wafer for only 2 –3 seconds to etch approximately 0.5Å – 5Å of a thermal oxide on the wafer after placing the wafer in a single wafer cleaning tool. This is because Lin does not teach applying the HF solution to a single wafer within a single wafer cleaning tool. The ability to apply the HF solution to the wafer for only 2 –3 seconds to etch a very thin layer of thermal oxide is due to the use of the single wafer cleaning tool that can dispense the HF solution onto a spinning wafer and then very quickly remove the HF solution from the wafer by spinning the wafer at a fast rate. Additionally, Lin does not teach the element of etching approximately 0.5Å – 5Å of a thermal oxide on said wafer. In contrast, Lin teaches etching the silicon wafer itself. Therefore, the Applicant respectfully submits that independent claim 67 and claims 68 – 78 that depend upon and incorporate the limitations of claim 67 are not obvious in light of Lin.

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Respectfully submitted,

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